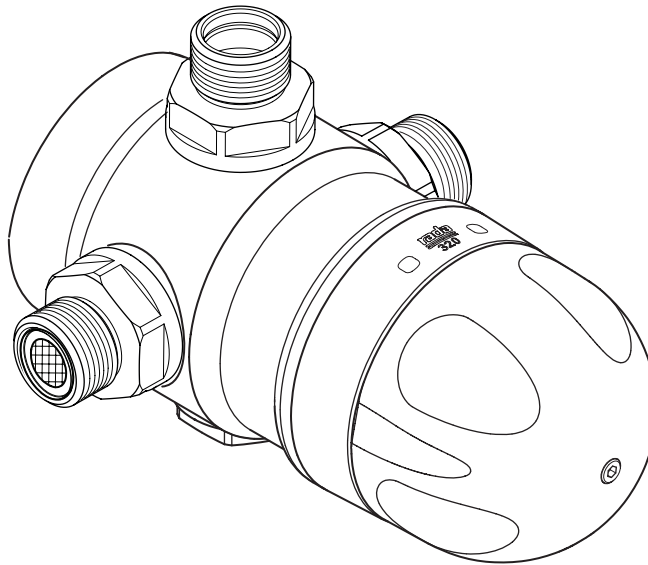




Model 320

Installation and Maintenance

Water Temperature Controls
Groups of Fixtures - Thermostatic



Model No. Model 320
 Model 320D

Serial No. :
Ship Date :



Armstrong International
221 Armstrong Blvd., Three Rivers, Michigan, 49093 - USA
armstronginternational.com/brain

Keep this manual with installation for
future reference.

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Water Temperature Control - Groups of Fixtures

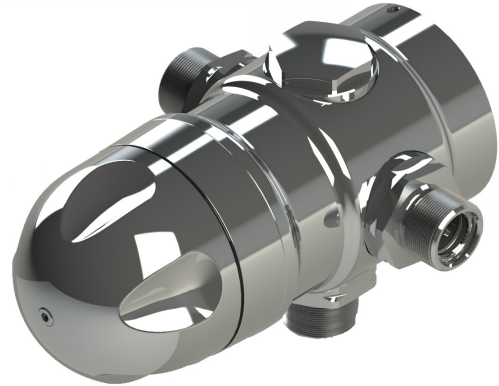
Thermostatic

Model 320

Thermostatic Mixing Valve of “sealed for life” disposable cartridge construction. Compact design with top and/or bottom blended water outlet makes the Model 320 ideal for recessed enclosure, plumbing chase and utility/mechanical room installation.

Complete operating mechanism of valve is enclosed in a durable polymer cartridge for ease of field maintenance. Powerful internal mechanism and non metallic wetted parts resist mineral deposition.

Capable of close temperature control at diverse flow rates between 1 gpm (3.8 lpm) and 24 gpm (91 lpm). Able to blend within 5°F (2°C) of either inlet supply due to “low seepage” across internal proportioning mechanism.

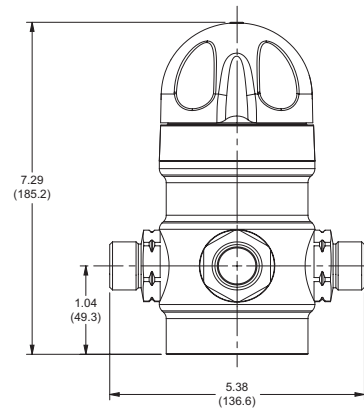
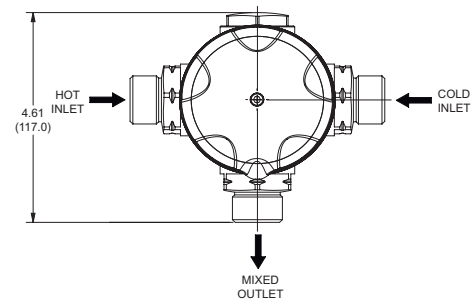


Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical outlet temperature control +/-2°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout
- Thermal shutdown mode upon inlet supply failure

Technical Specifications

- 3/4” MNPT inlets and 3/4” MNPT outlet
- Chrome-plated brass/polymer construction
- Lead Free compliant
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Integral inlet check valves and strainers
- ASSE 1017 and CSA B125 certified
- Shipping weight 10 lbs (4.5 kg)



Thermostatic Mixing Valves (GPM and PSI)												
Model 320	Pressure Drop (PSI)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
GPM	8	11	13	15	17	19	20	22	23	24	1.0	3.4

Thermostatic Mixing Valves (LPM and BAR)												
Model 320	Pressure Drop (BAR)										Min. Flow	C _v
	0.3	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.1	3.4		
LPM	30.3	41.6	49.2	56.8	64.4	71.9	75.7	83.3	87.1	90.8	3.8	3.4



Water Temperature Control - Groups of Fixtures

Thermostatic

Model 320D

A derivative of the standard Model 320 Thermostatic Mixing Valve for institutional group fixture control. Compact design with top and/or bottom blended water outlet makes Model 320 ideal for recessed enclosure, plumbing chase and utility/mechanical room installation.

Factory supplied pre-plumbed and pressure-tested Model 320D is supplied as standard with inlet check valves, strainers, unions, isolations valves and outlet thermometer and stop valve*.

*Model 320D is supplied with top outlet and can be site reconfigured for bottom outlet applications.

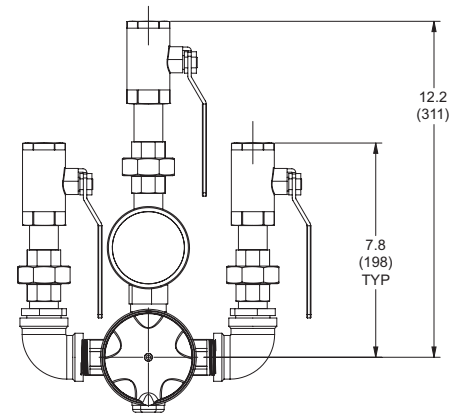
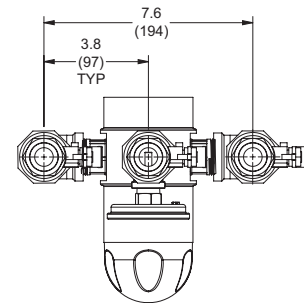
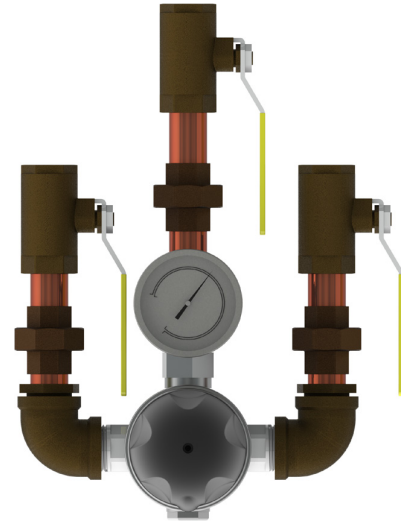
Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure.
- Typical outlet temperature control +/-2°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout
- Thermal shutdown mode upon inlet supply failure

Technical Specifications

- 3/4" NPT inlets and 3/4" NPT outlet
- Chrome plated brass/polymer construction with self finish brass and bronze lead free components
- Lead Free compliant
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Inlet check valves, strainers, unions and isolation valves
- Fitted with outlet thermometer and isolation valve
- ASSE 1017 and CSA B125 certified
- Shipping weight 18 lbs (8.1 kg)

For a submittal drawing, refer to D61051.



Thermostatic Mixing Valves (GPM and PSI)												
Model	Pressure Drop (PSI)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
GPM	8	11	13	15	17	19	20	22	23	24	1.0	3.4

Thermostatic Mixing Valves (LPM and BAR)												
Model	Pressure Drop (BAR)										Min. Flow	C _v
	0.3	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.1	3.4		
LPM	30.3	41.6	49.2	56.8	64.4	71.9	75.7	83.3	87.1	90.8	3.8	3.4

Specifications

Operating Specifications		
Maximum Hot Water Supply Temperature	185°	158°F (70°C)*
Minimum Cold Water Supply Temperature	33°	33°F (1°C) - 77°F (25°C)
Optimum Minimum Inlet to Outlet Temperature Differential		59°F (15°C)**
Optimum Thermostatic Control Range		86°F (30°C) - 122°F (50°C)
Flow Rate at 45 psi		23 gpm (87 lpm)
Minimum Flow Rate		1 gpm (3.8 lpm)
Maximum Inlet Supply Pressure		150 psi (10 bar)
Minimum Inlet Supply Pressure		10 psi (0.7 bar)

*Model 320 can accept temporary excursions above 185°F (85°C) and maintain control without sustaining internal damage. (ASSE 1017 certification requires exposure to 200°F (93°C) for a period of 30 minutes). Prolonged operation of the Mixing Valve at such elevated temperatures is not recommended.

** Normal operating conditions are considered as a differential of approximately 122°F (50°C) between the hot and cold inlet temperatures, and with differentials of 59°F (15°C) - 95°F (35°C) between the blend setting and either supply. 59°F (15°C) is the optimum published minimum differential required to achieve full thermal performance.

General Advisory

This Model 320 Valve has been supplied for this application based upon information provided to Armstrong at the time the order was placed.

This Model 320 Valve is configured for use in a “dead-leg” piping configuration.

This Model 320 Valve has **not** been configured for use in a central pumped re-circulation system.

This Model 320 Valve is **not** designed to deliver tepid water to emergency fixtures.

For further information, please call our technical department 1-269-279-3602 between 08:00 a.m. to 05:00 p.m. EST.

Safety

Icon Legend

If instructions are not followed:



- injury or death and property damage are ***imminent***



- injury or death and property damage are ***possible***



- potential property damage, expensive repairs, and/or voiding the warranty may result



- Applicable codes must be followed and supersede any other instructions. Generally applicable codes in the US include:
 - IPC (International Plumbing Code)
- Read this manual
- Improper installation or operation may cause a flood resulting in property damage, personal injury, or death. Armstrong strongly recommends that a qualified installer be used.
- Service must be performed by a qualified person.
- Improper installation, start-up, operation, maintenance, or service may void the warranty.



Hot water or metal may cause scald burns. Skin exposure to 140°F water or metal for only five seconds may cause a second degree burn.

The function of a Thermostatic Mixing Valve is to deliver water consistently at a pre-designated temperature.

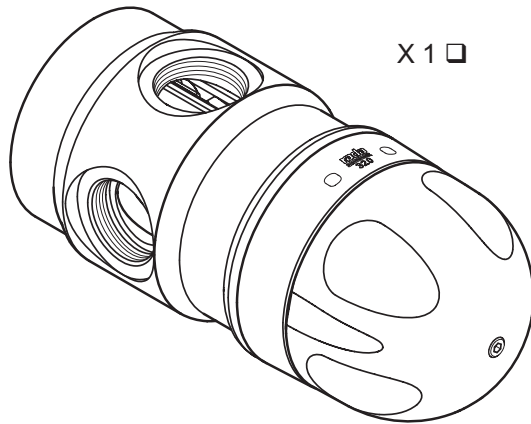
Model 320 Thermostatic Mixing Valves are precision engineered to give continued superior and safe performance provided:

- 1. They are installed, commissioned, operated and maintained in accordance with the recommendations provided and accepted plumbing practices.**
- 2. Periodic attention is given, as necessary, to maintain the product, the accessory fittings and the plumbing system in good functional order.**

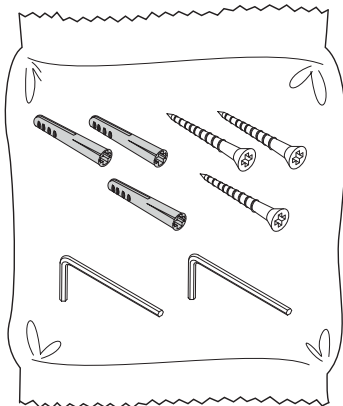
In keeping with every other mechanical product, Model Mixing Valves should not be considered as functionally infallible and, as such will never totally replace the vigilance and attention of facility nursing/ bathing or other institutional supervisory or industrial safety staff.

Provided that they are installed, commissioned, operated and maintained, the risk of product failure and its associated consequences, if not eliminated, are reduced to the minimum achievable.

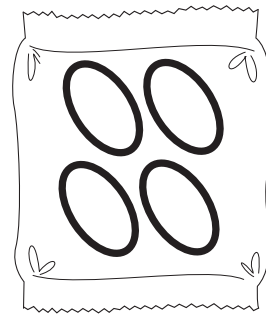
Pack Contents



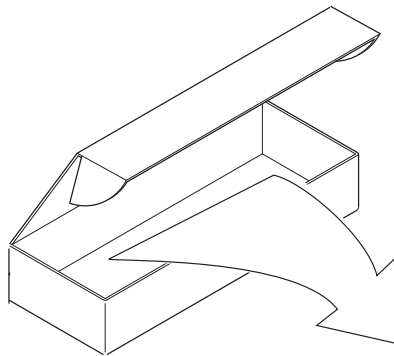
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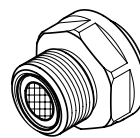
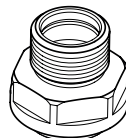
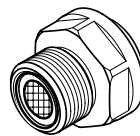
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X 1 □

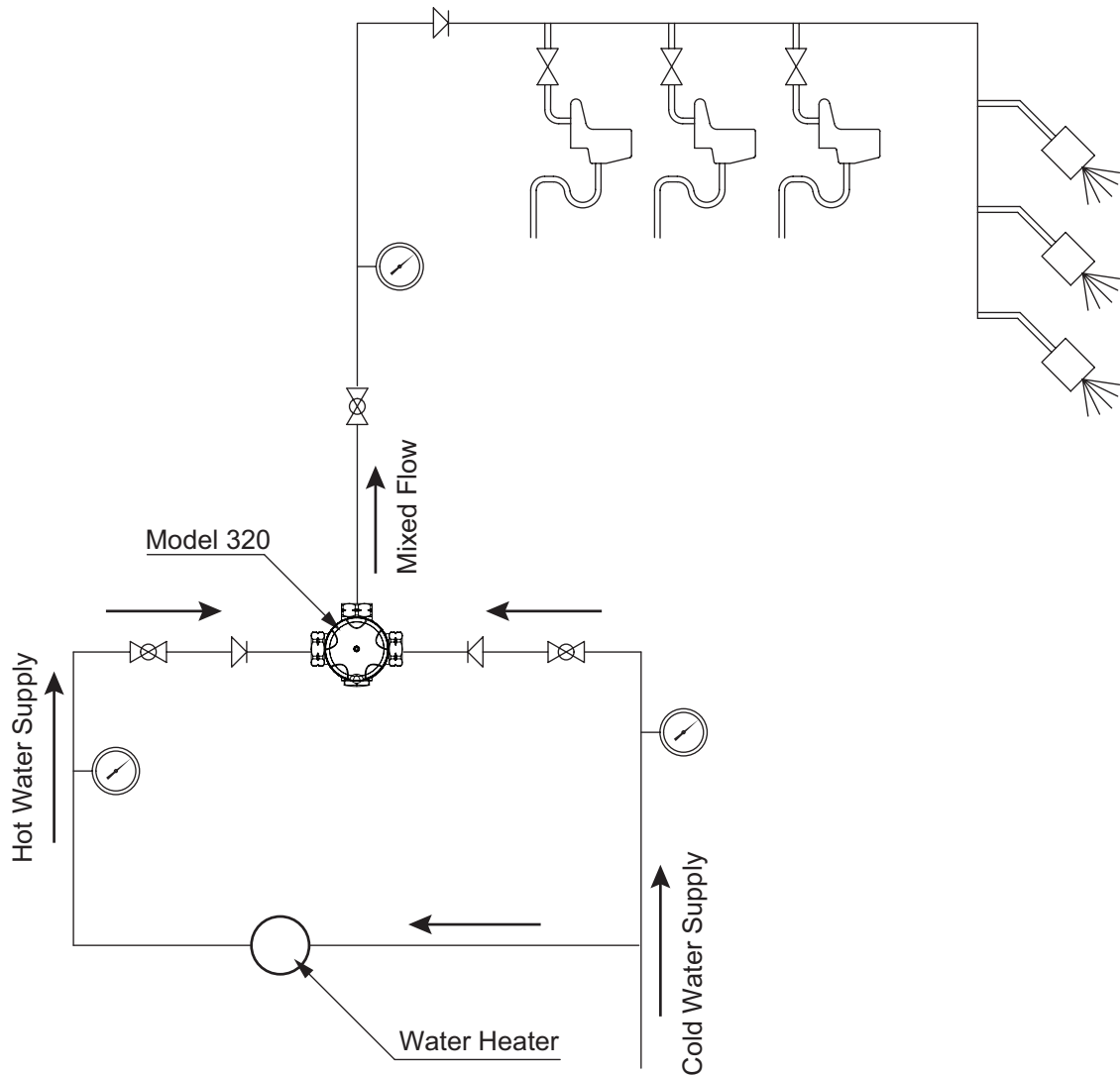










X 1 □



X 3 □

Schematic Piping



System Layout			
	Thermometer		Isolation Valve
	Sink		Stop Valve
	Shower		Flow Direction
	Check Valve		Pipeline

Installation

General

Installation must be carried out in accordance with these instructions, and must be conducted by designated, qualified and competent personnel.

The installation must comply with all relevant local and state water plumbing codes.

All plumbing components are to be supplied by the installer. Failure to include these components will compromise the product, system performance and will void the warranty.

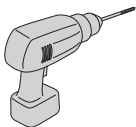
Notes:

1. Model 320 is supplied fully performance and pressure tested.
2. Suitable connections for ease of maintenance should be used on the inlet and outlet ports. (*Isolation valves and unions.*)
3. The hot and cold water inlet supply pressures must be nominally equal.
4. The inlet supply pipework **must** be thoroughly flushed before fitting the Model 320 valve.
5. The Model 320 can be installed in both rising supplies and falling supplies.

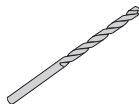
Installation Requirements

- 1 The use of supply strainers will reduce debris entering the Model 320. The recommended gauge for such strainers is 35 mesh (mesh aperture dimension = 0.5mm).
- 2 Inlet pressure tapings which allow measurement of the inlet pressures to the Model 320 under operating conditions are particularly recommended for in-service testing.
- 3 Pipework must be rigidly supported to avoid any strain on the connections.
- 4 Inlet and outlet threaded joint connections should be made with PTFE thread sealing tape or liquid sealant. Do not use oil-based, non-setting joint compounds.
- 5 Run water for 1 minute from both hot and cold supplies to eliminate pipe debris. It is essential that supply pipes are thoroughly flushed through before connection to the Model 320.

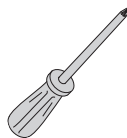
Tools Required



Drilling Machine



Drill Bit
size 6 mm



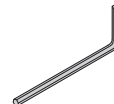
Screw Driver
Plus & Minus



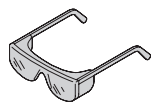
Pencil



Adjustable
Spanner

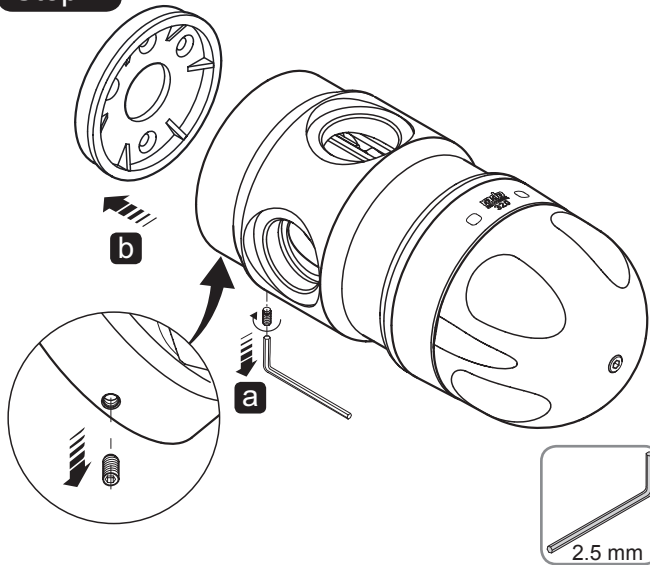


Allen Keys
3mm & 2.5mm



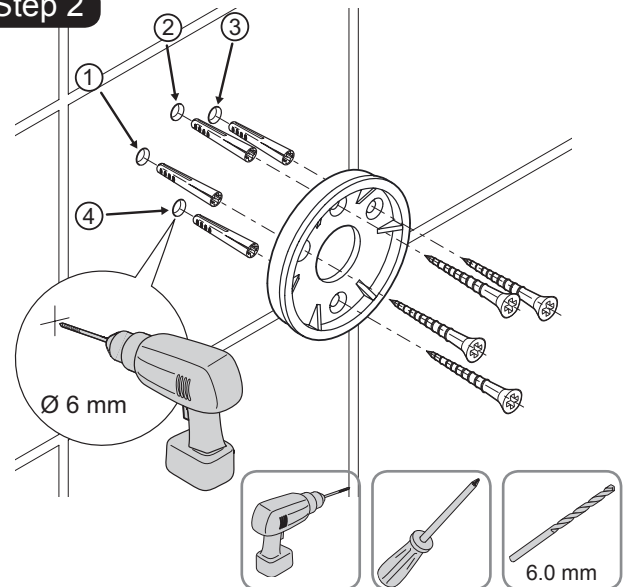
Safety
Glasses

Step 1



- a. Unscrew the set screw.
- b. Remove the Backplate.

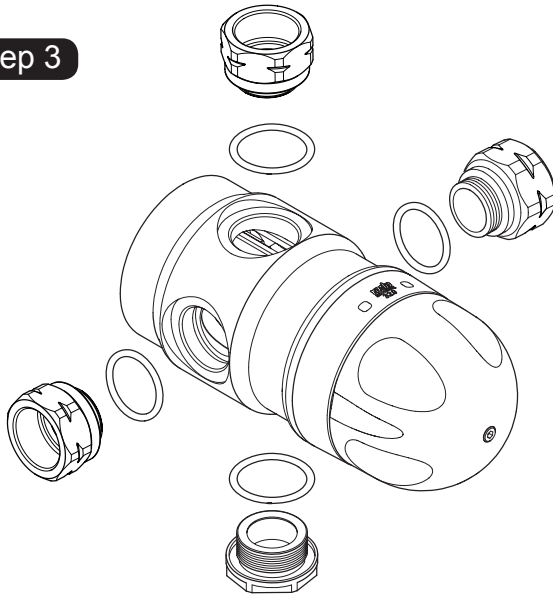
Step 2



- a. Use the Backplate to mark the four mounting holes at the desired height.
- b. Drill the holes (6 mm) and fit the wall anchors. Screw the Backplate to the wall.

Caution! Avoid area where underground wirings or pipelines pass through.

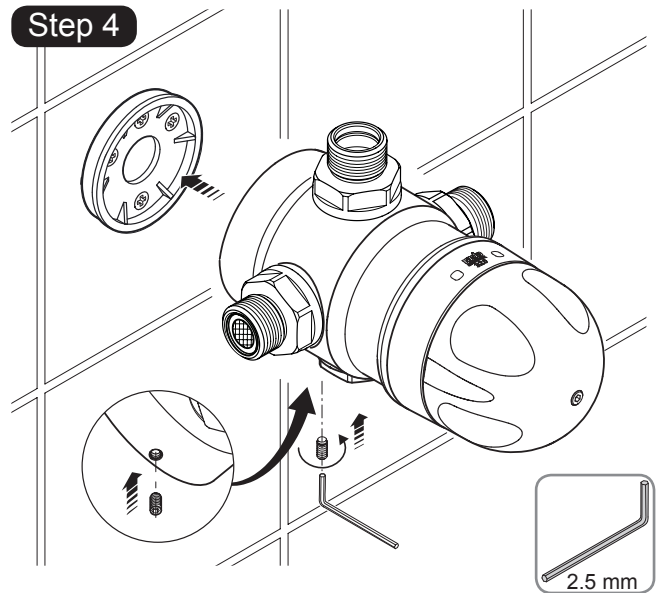
Step 3



- a. **Important!** Prior to assembly of the hot and cold adapters, look inside each one and ensure that there is a strainer and a white plastic checkvalve. The adapter with nothing inside is for the outlet. Thread the coupling nuts onto the Valve assembly then tighten using an adjustable spanner.

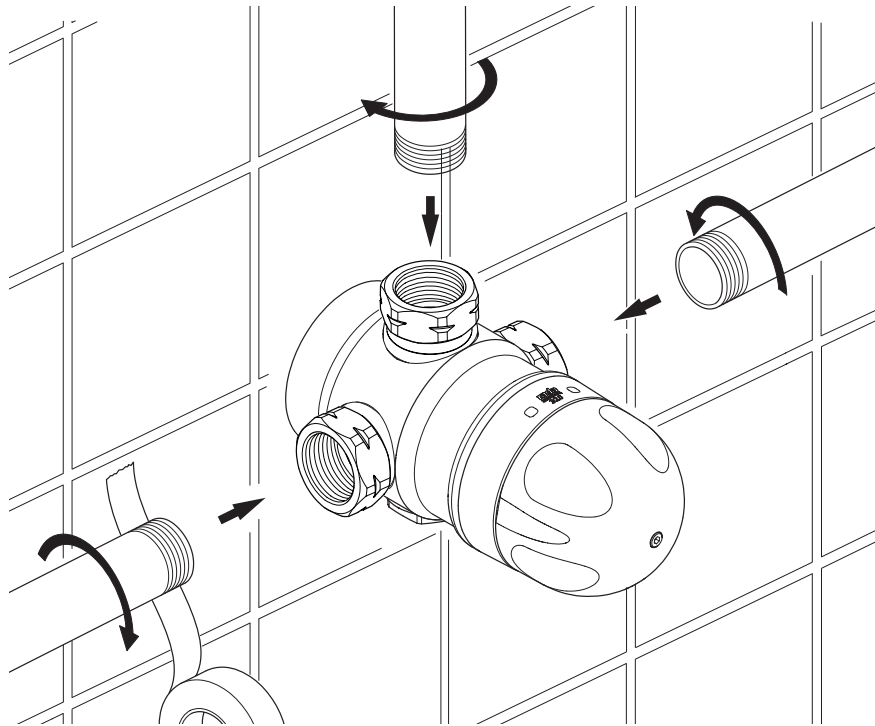
Caution! Use a soft cloth to protect the plating from damage while tightening the spanner.

Step 4



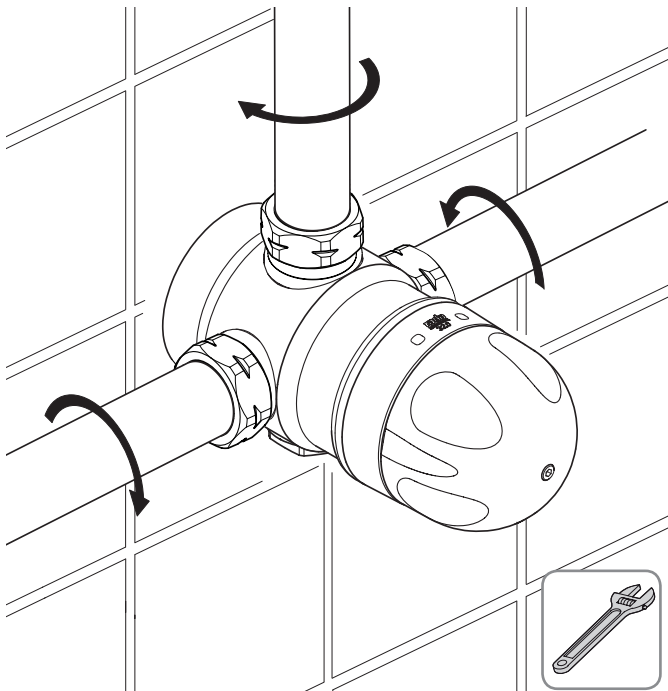
- a. Mount the Valve assembly on the Backplate fixed on the wall. Make sure the Valve assembly locks in the groove.
- b. Tighten the set screw.

Step 5



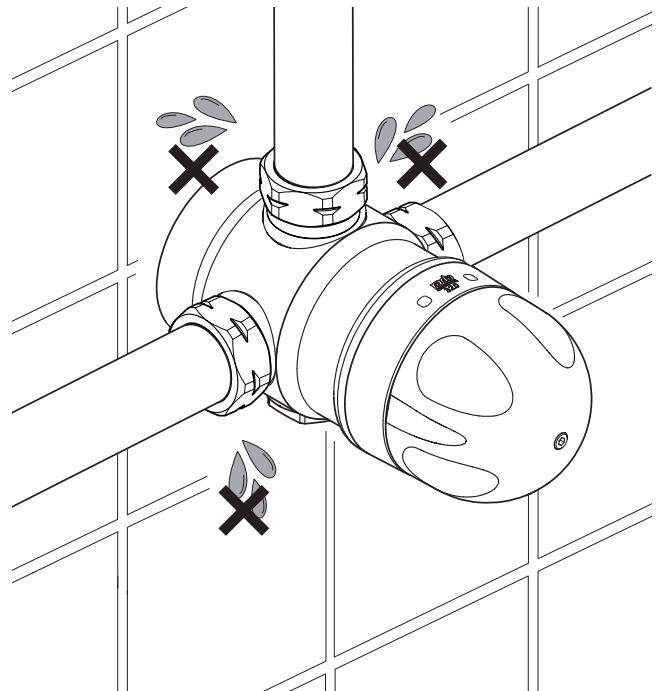
Model 320 must be installed in a standard **HOT-LEFT/COLD-RIGHT** inlet supply configuration. There are red (hot) and blue (cold) markings on each valve. The inlet supplies must always match the corresponding inlet ports on the valve.

Step 6



a. Fully tighten all of the pipes using an adjustable spanner.

Step 7



a. Turn on the water supply and ensure that there are no leaks.



Caution! Use a soft cloth to cover the plating from damage while tightening with spanner.

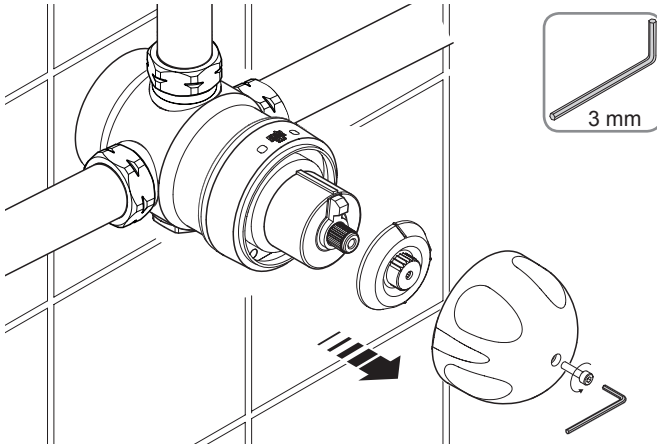
Commissioning

Model 320 is designed for two types of configurations:

1. Locked Temperature (Temperature control is locked and cannot be adjusted)
2. Adjustable Temperature (Temperature can be adjusted through a desired range)

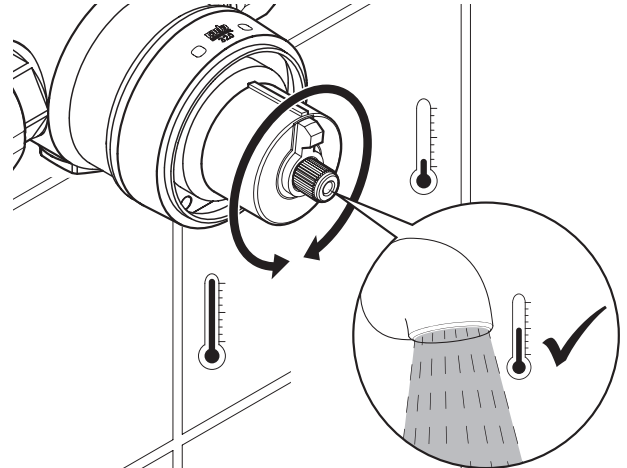
The following steps show the procedure for both type of installations:

Step 1



- a. Remove the concealing cap.
- b. Unscrew the knob using a 3mm Allen Key.
- c. Remove the Knob and Hub.

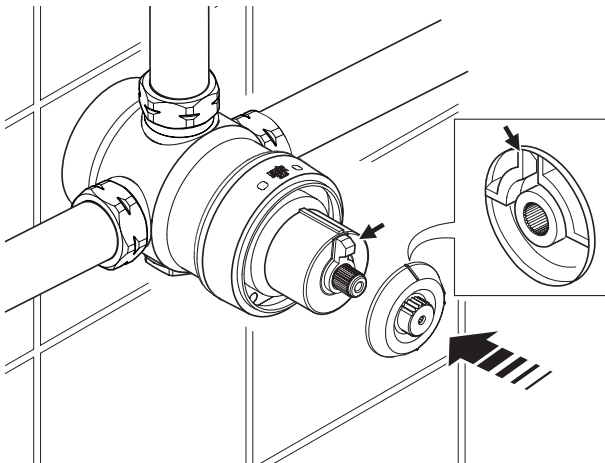
Step 2



Open the hot and cold water supplies and open outlets prior to adjusting the temperature. Rotate the spindle to adjust the temperature to a desired level.
Clockwise = Decrease temperature.
Anti-clockwise = Increase temperature.
Keep the spindle undisturbed.

Step 3

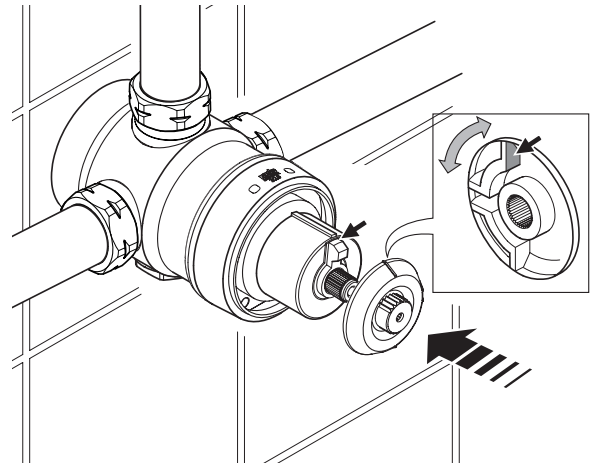
For Locked temperature



Obtain the desired maximum blend temperature then re-fit the Hub in the 6 o'clock position so that the Center Stop Slot fits over the Cartridge Stop, locking rotation in either direction.

Factory pre-set outlet temperature = 110°F (43°C)

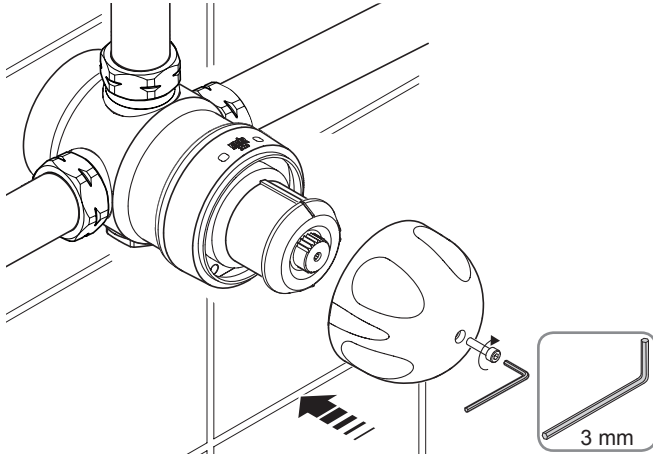
For Adjustable temperature



Obtain the desired maximum blend temperature then re-fit the Hub in the 9 o'clock position so the Hub Stop hits the Cartridge Stop, preventing further anti-clockwise rotation.

This sets the desired temperature as maximum achievable temperature.

Step 4



Re-fit the Knob, tighten the screw and replace the concealing cap.
Make sure the indicator is in either the 9 o' clock position (adjustable temperature configuration) or 6 o' clock position (locked temperature configuration).

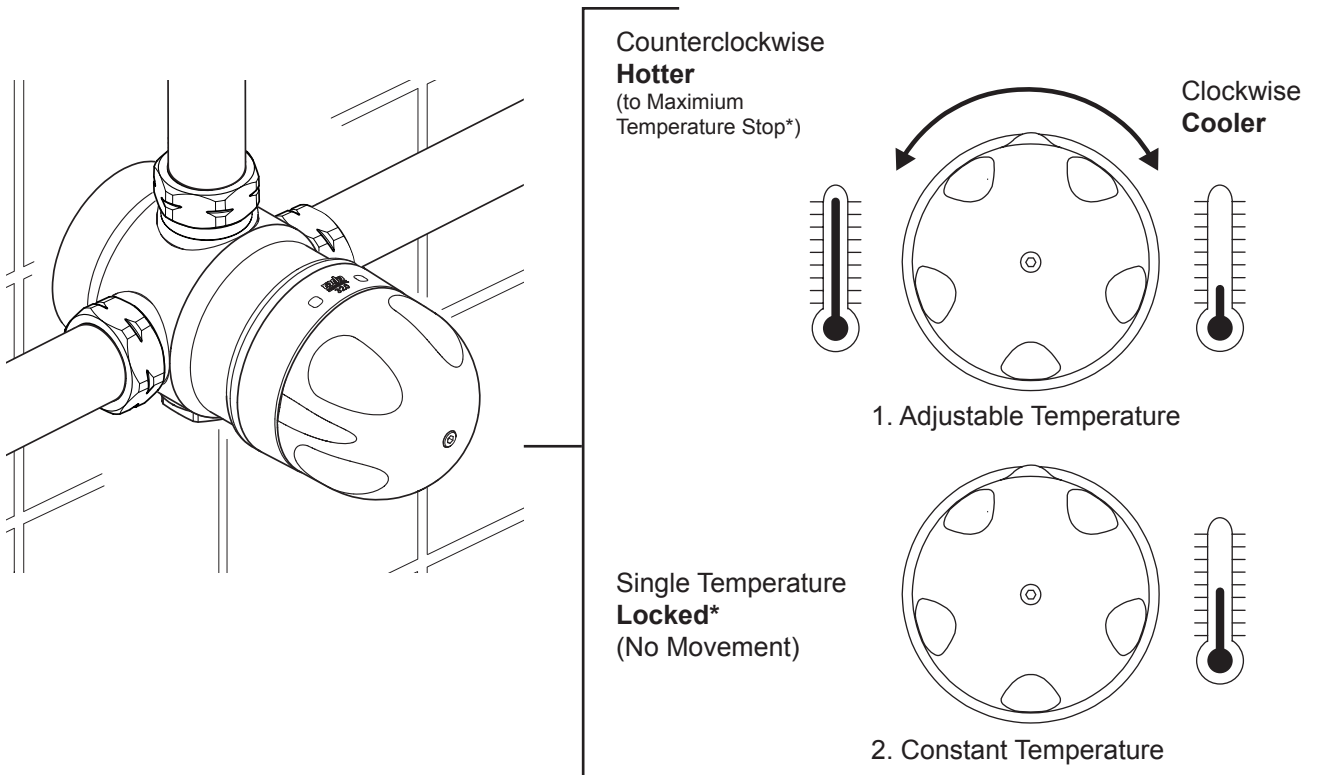
Exercising the Thermostat

Thermostatic mixing valves with thermostats are inclined to lose their responsiveness if not used. Valves which have been in storage, installed but not commissioned, or simply not used for some time should be exercised before setting the maximum temperature or carrying out any tests. A simple way to provide this exercise is:

1. Ensure that the hot and cold water are available at the valve inlets, and the outlet is open.
2. Move the temperature control rapidly from cold to hot and hot back to cold several times, pausing at each extreme.

Operation

For models with a standard temperature knob fitted, adjustment of the blend temperature from preset maximum to cold is achieved by clockwise rotation of the knob.



*Maximum temperature stop or single temperature locking feature is established during the on-site commissioning protocol .

Servicing & Maintenance



Warning! Isolate water supply to Model 320 before proceeding.

Model 320 Thermostatic Mixing Valves and its components should be inspected annually, or more frequently where acknowledged site conditions such as high mineral content water dictate.

Model 320 Thermostatic Mixing Valve is of a sealed single “cartridge construction”. The cartridge can be removed from the valve for inspection or replacement. To access the valves internal components for inspection, cleaning or replacement proceed as follows.

Maintenance must be carried out in accordance with these instructions, and must be conducted by designated, qualified and competent personnel. This mixing valve is designed for minimal maintenance under conditions of normal use. External surfaces may be wiped clean with a soft cloth, and if necessary, a mild detergent or soap solution can be used.



Warning! Many household and industrial cleaning products contain mild abrasives and chemical concentrates, and should not be used on polished, chromed or plastic surfaces.

Components are precision-made, so care must be taken while servicing to avoid damage.

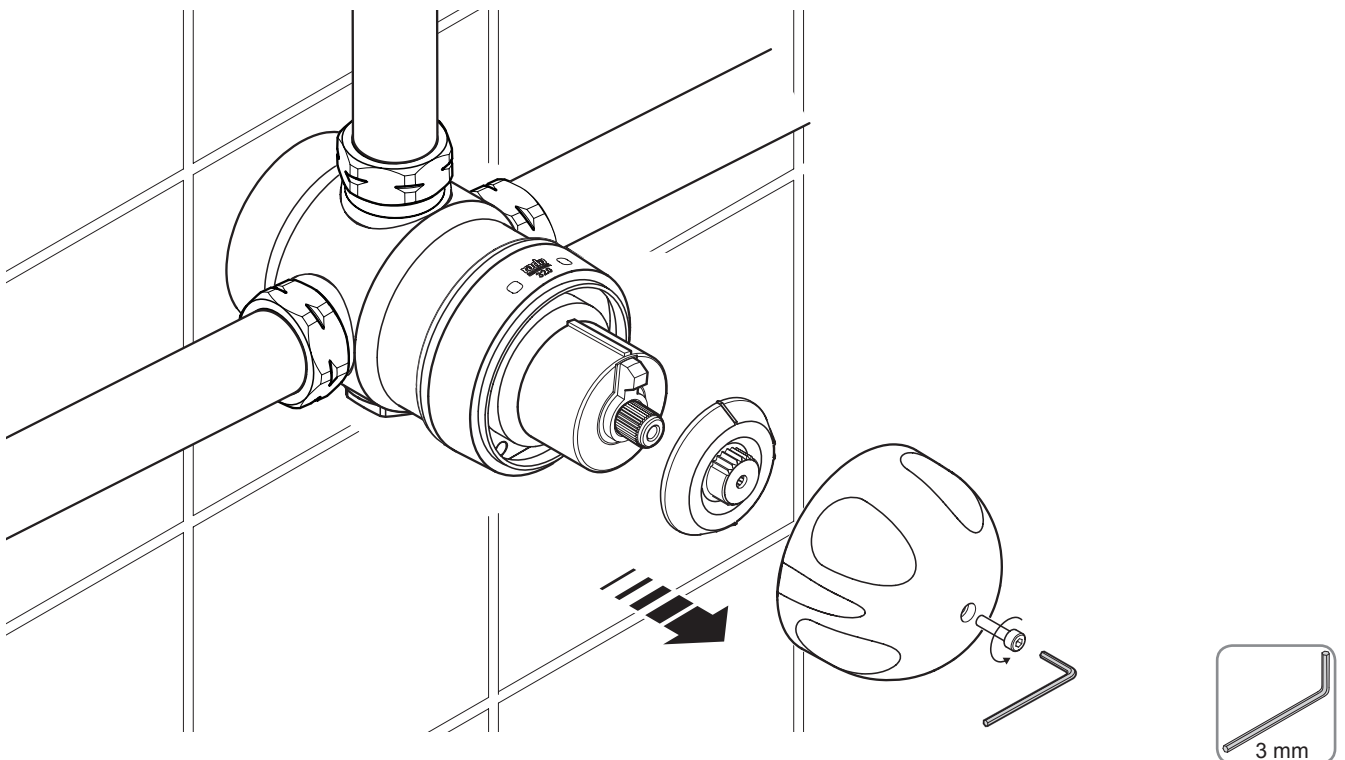
Lubricant

Important! All seals are pre-lubricated. If you need to further lubricate the seals, use only a small amount of silicone-only based lubricants on this product. Do not use oil-based or other lubricant types as these may cause rapid deterioration of seals.

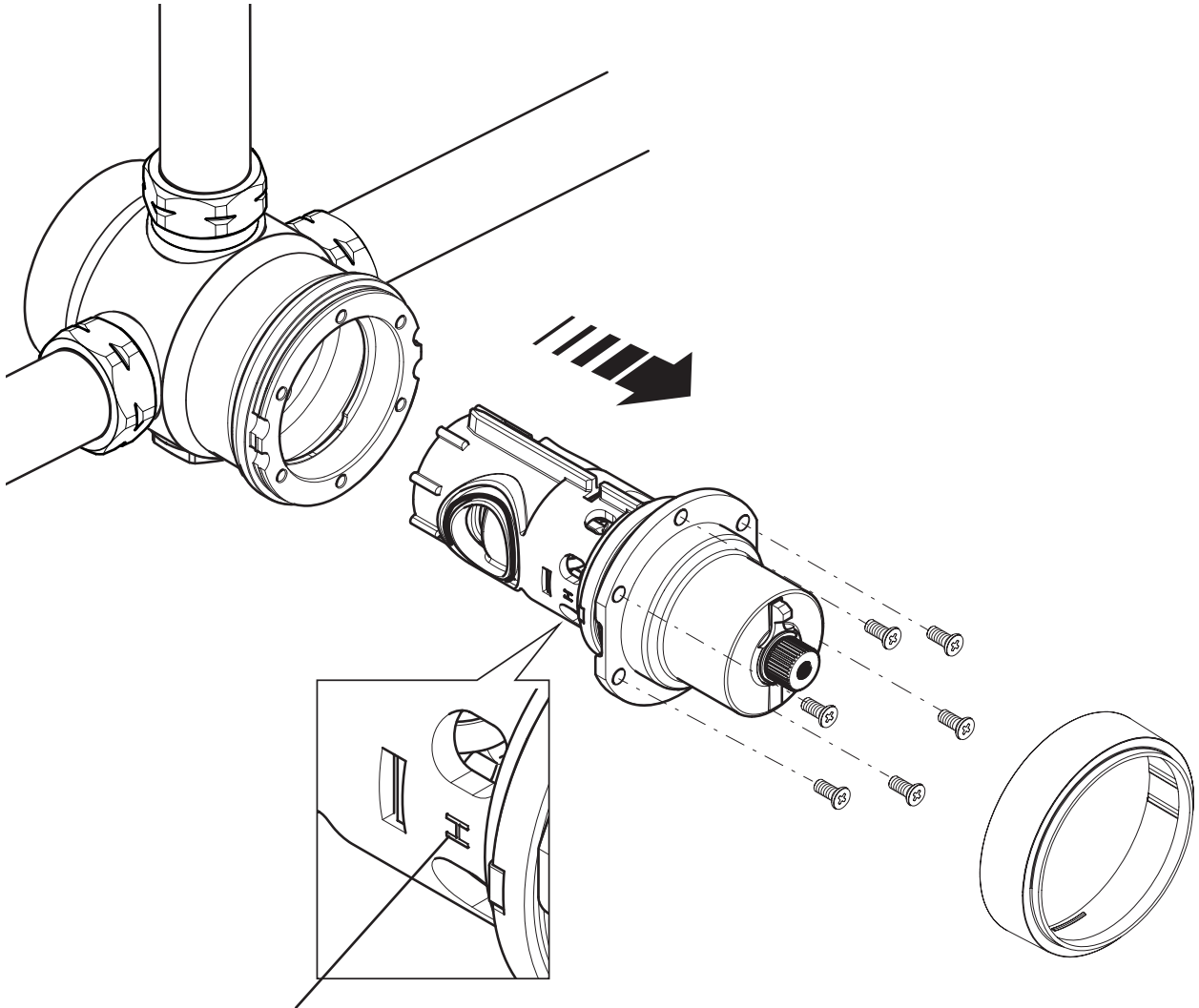
Maintenance Procedure - Cartridge Assembly

Isolate the water supplies to the mixing valve. Open an outlet fitting to release pressure and to assist the draining of residual water.

Step 1



Step 2



'H' and 'C' marked on cartridge. Make sure that the 'H' is lined up with the hot inlet and that the 'C' is lined up with the cold inlet



Disassembly

1. Unscrew the knob using a 3mm Allen Key.
2. Remove the Knob and Hub.
3. Remove Temperature Indicator Trim.
4. Remove the cartridge assembly by first removing the six phillips head-retaining screws and then smoothly drawing the cartridge out. Do not twist or apply "side load" leverage when extracting the cartridge.
5. When installing a new or reinstalling an existing cartridge note the raised "H" on the hot inlet of the cartridge and align to hot supply accordingly. Conversely, align raised "C" with cold supply.

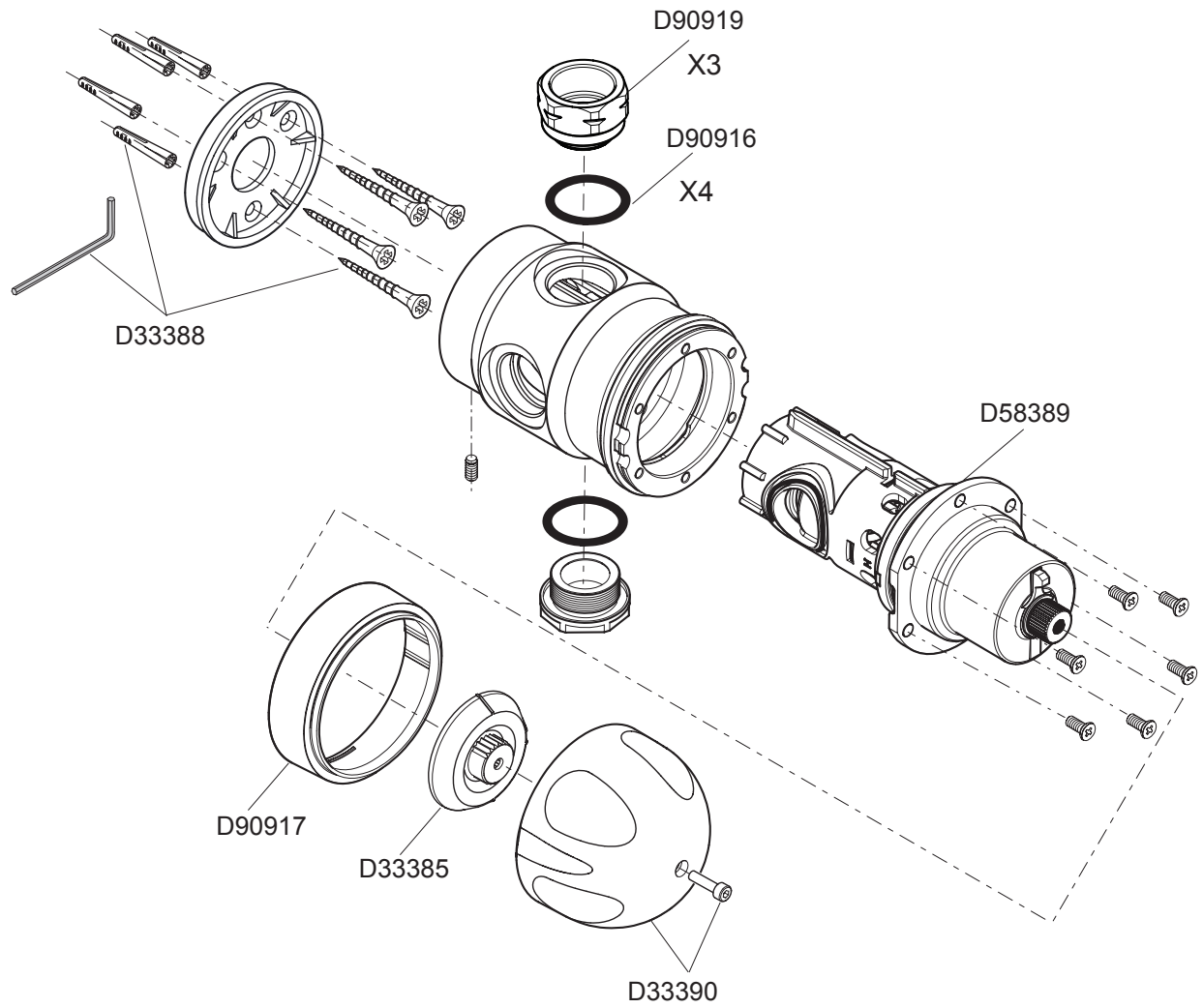
Cleaning/Renewal of Parts

1. Internal parts (with the exception of the Thermostat Assembly) can be cleaned using a mild proprietary inhibited scale solvent e.g. domestic kettle descaler. After descaling, always rinse parts thoroughly in clean water before refitting.
Note! The body interior must be cleaned carefully and not damaged in any way. Do not use any abrasive material.
2. Examine all accessible seals for signs of deformation or damage, and renew as necessary, taking care not to damage the seal grooves.
3. Lightly smear all seals and threads with a **silicone-only based lubricant** to assist re-assembling.
4. Inspect the thermostat assembly for signs of damage.
Note! This component cannot be tested individually, its service condition should be assessed as part of the performance check; refer to **Commissioning Checks**.
5. Examine the Cartridge Assembly for signs of damage or corrosion; renew as necessary.

Re-assembly

1. Install a new or an existing cartridge. Align the marked "H" on the hot inlet of the cartridge to hot supply and "C" on the cold inlet of the cartridge to cold supply.
2. Re-fit the Cartridge Assembly and secure in position with the six phillips head-retaining screws.
3. Re-fit Temperature Indicator Trim.
4. Before fitting the hub, the temperature will need resetting; refer to **COMMISSIONING**.
5. Re-fit the Hub and Knob.
6. Tighten the screw using a 3mm Allen Key.

Model 320 Spare Parts



Part No:		Description	Note
A	D33385	Hub Pack	
B	D33390	Knob Pack	
C	D58389	Cartridge Assembly	
D	D90916	Seal Pack	
E	D33388	Screw Pack	
F	D90917	Indicator Trim	
G	D90918	3/4" Check Valve Service Pack - 1 Pair	
H	D80012	3/4" Male NPT Connector Pack	Includes (2) inlet connectors complete with checkvalves, one outlet connector, one outlet plug
I	D90919	3/4" Female NPT Connector Pack	Includes (2) inlet female connectors with no checkvalves, one outlet female connector, one outlet plug

Troubleshooting

Fault Diagnosis

Read the section “**Important Safety Information**” first.

If any maintenance is required then it **must** be carried out by a competent tradesperson. Before replacing any parts make sure that the underlying cause of the malfunction has been resolved.

Warning! There are no user serviceable components beneath the casing of the appliance. Only a competent tradesperson should remove the cover.

Symptoms	Probable Cause	Possible Remedy
1. Only hot or cold water from outlet.	a. Inlet supplies reversed (i.e.: hot to cold or vice-versa)	Check-Rectify. Tip: Check rear of valve under polymer mounting plate for raised “H” (hot) on appropriate inlet. If sight evaluation is not possible consult factory Technical Support for additional diagnosis tips.
	b. No hot water available from hot water source.	Check-Rectify
	c. Screen/filters occluded or inlet supply fittings plugged.	Refer to Servicing/Maintenance - Rectify.
	d. Refer to Symptom 4 below.	Refer to Symptom 4 below.
	e. Proportioning mechanism (Cartridge) trapped against hot/cold seat.	Refer to Servicing/Maintenance.
2. No flow from Mixing Valve outlet.	a. Hot or Cold inlet supply failure; Thermostat holding correct shutdown function.	Check-Rectify.
	b. Screens/filters blocked or inlet supply fittings plugged.	Refer to Servicing/Maintenance - Rectify.
3. Mixed water temperature at TMV outlet fluctuates and does not respond to adjustment.	a. Thermostat not operating correctly.	Replace Cartridge.
	b. Mixing Valve operating below minimum required flow rate.	Check that at least 2 GPM is flowing through valve.
	c. Static inlet supply pressures beyond valves capability to correct.	Check-Rectify
	d. Inlet supply pressures fluctuating beyond valves capability to correct.	Check-Rectify
	e. Hot water supply temperature fluctuating beyond valves capability to correct.	Check by carefully sensing inlet hot supply pipe work- rectify.
	f. Partially occluded screens/filters or partially blocked inlet fittings.	Refer to Servicing/Maintenance - Rectify.
4. Hot water in cold supply and vice-versa.	a. Indicates non-functioning check valve (s).	Diagnose by turning off mixed water outlet flow and check to see if inlet hot pipe work becomes cold and vice-versa.

(contd...)

5. Mixed water temperature too high.	a. Mixing Valve set too high and has not been commissioned correctly.	Refer to Commissioning - Rectify.
	b. Mixing Valve has not been commissioned correctly and was set when the hot supply temperature was too low.	Refer to Commissioning - Rectify.
	c. Hot water is migrating into cold supply.	See Item 4 above.
	d. Thermostat not operating correctly.	Replace Cartridge.
6. Mixed water temperature too low.	a. Mixing Valve set too low and has not been commissioned correctly.	Refer to Commissioning - Rectify.
	b. Hot water heat is not keeping up with demand.	Check-Rectify.
7. Mixed water flow rate is reduced.	a. Partially occluded inlet screens/filters or partially blocked inlet fittings.	Refer to Servicing/Maintenance - Rectify.
	b. Inlet supply pressure has fallen.	Check-Rectify.
	c. Accumulated pressure losses within the system are too high.	Refer to a trained and appropriate authority for system sizing assistance.
8. Water leaking from valve body.	a. Seals worn or damaged.	Obtain Seal Pack and renew all seals.

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